Investigating the effect of Technology Adoption towards the Continuance of Broadband Intention in Malaysia

Abdul Rahman Bin Mohamad Saleh[1], Mustakim Bin Melan[2]*, CheSobry Bin Abdullah[3]*
Universiti Utara Malaysia, School of Technology Management and Logistic[1,2,3]

msrahman45@gmail.com[1]
mustakim@uum.edu.my[2]
sobry@uum.edu.my[3]

Abstract: The aim of this paper is to investigate the technology adoption factor towards the continuance broadband intention among the households in Malaysia. Information and communication technology (ICT) is the most efficient way to develop the literacy of knowledge and skills among its users, and broadband is the key factor to spread the ICT infrastructure. By understanding the factor of continuance of broadband intention (CBI), the researcher explores the factors that affect household broadband penetration (HBP) as well. Furthermore, this study will gauge the effectiveness of the Universal Service Provision (USP) projects especially 1Malaysia Internet Center1Malaysia (Pi1M) towards CBI. The findings will provide evidence and suggestions for policy makers and service providers to improve the implementation of USP projects or to suggest any better projects to ensure a sustainable growth of broadband penetration in Malaysia. The study adapted the model of adoption of technology in household (MATH) and satisfaction as the moderating factor that forming a modified in a cross-sectional, survey-based study. The relations among the constructs of the proposed model were then hypothesised according to the literature findings and examined using SMART PLS 3.0. Population and samples of the study were drawn from the users of Pi1M in six regions of Malaysia (northern, central, southern, east coast, Sabah, and Sarawak). Conducted between October and December 2016, the cross-sectional study involved 386 respondents. The findings indicate that control construct is the key factor that has shaped customers' continuing behaviour intentions towards broadband usage and subscription. At the same time, this study also findspositive association between satisfaction and CBI among Pi1M users. Despite the growing number of studies on intention and adoption of technology, little research has been done on theory-building and the linkage between CBI and the two aforesaid factors: control construct under the MATH model and satisfaction. This study was conducted to fill the gap.

Keywords: Continue Broadband Intention (CBI),Satisfaction, MATH Model, Public telecenters, Smart PLS, Digital divide

INTRODUCTION

In many countries, the policy to ensure the growth of broadband coverage is very important because it serves as the catalyst for internet penetration. Nowadays, broadband affects daily business productivities. The International Telecommunication Union (ITU)estimates in average of a ten-percent increase in broadband penetration especially on mobile broadband technology, which in turn, could increase a country's total productivity factor by 4.2% in the long run (ITU, 2016). However, only few studies have examinedcritical technology management especially in termsof broadband penetration in households.Many other initiatives have been introduced by the government to ensure the growth of Household Broadband Penetration (HBP) and reduce the digital divide.One of the key projects is the deployment of 1Malaysia Internet Center or Pusat Internet 1Malaysia (Pi1M) (MCMC, 2014). Pi1M was chosen as the subject of this study due to the significant amount of investment made by MCMC ontelecentres types of projects since 2009.

Given the above points, the present research intends to study the impact ofPi1M's deployment on HBP after years of implementation nationwide. Without prejudice, the key objective of this deployment is to introduce the usage of broadband by improving the broadband internet infrastructure and facilities among the dwellers within a particular area.As explained byKiran and Vasantha(2016),consumers' inclination towards a product or services is important in creating purchase intention. However, a study byAziz et al. (2009)uncovered that MCMC has been facing challenges on how to increase attraction and retain people's motivation to use the broadband, either in the telecentres or at home.Nevertheless, in some places,telecentres are still seen as placesfor users to accessgovernment's websitesandplay games.

1.1   The 1Malaysia Internet Center

1Malaysia Internet Center (Pi1M) has now reached eight years of execution and has brought considerable social and financial impacts onthe users, especially the rural dwellers. This is precisely the expectations of the Commissionwho intend to provide broadband services and administrations to underserved zones. The Commission has always endeavoured to move forward the usage of PI1M every now and then.In 2013, theybegan presenting PI1M in urban territories, focusing onunderserved areas and poor group, particularly by incorporating the debilitated and the groups who live in Individuals' Housing Project (PPR).Other than providing access to broadband services (MCMC, 2014),Pi1M also offers (1) ICT and entrepreneurship development trainingsand (2) other services such as printing, overlaying, and photocopying at very minimum charges.Unfortunately, there is no recent study on the impact of Pi1Mon any telecentre deployed by MCMC to the HBP. A study by Aziz et al. (2009) alsofound that the telecentres have been focusing heavily on introducing the Internet,yet at certain extent, are still seen merely as places where children, teenagers, and youth access government's websites and play games. Given these points, this study intends to uncover the factors that have influenced the usage and success of public telecentresin order to improve broadband penetration.

1.2   Household Broadband Penetration (HBP)

Household broadband penetration (HBP) is an international index formed by International Telecommunication Union (ITU) with the objective to gauge a country's broadband penetration rate.Eventhough HBP in Malaysia for 2015 already surpassed 71% and is on upward trend,the rate in some stateshas surprisinglydropped significantly(MCMC,2015) (Figure 1.1). This was notablein states with the lowest HBP, such as Perlis, Negeri Sembilan, and Terengganu, which markeda significant drop of 23% from end of June 2014 to further 39%, but increased to 57.3% at the end of 2016. In contrast, Putrajaya recorded the highest penetration among the states, with 96%of HBP in 2014 and 98.5% in 2015, yeta surprise steep fall to 61.9% at the end of 2016.
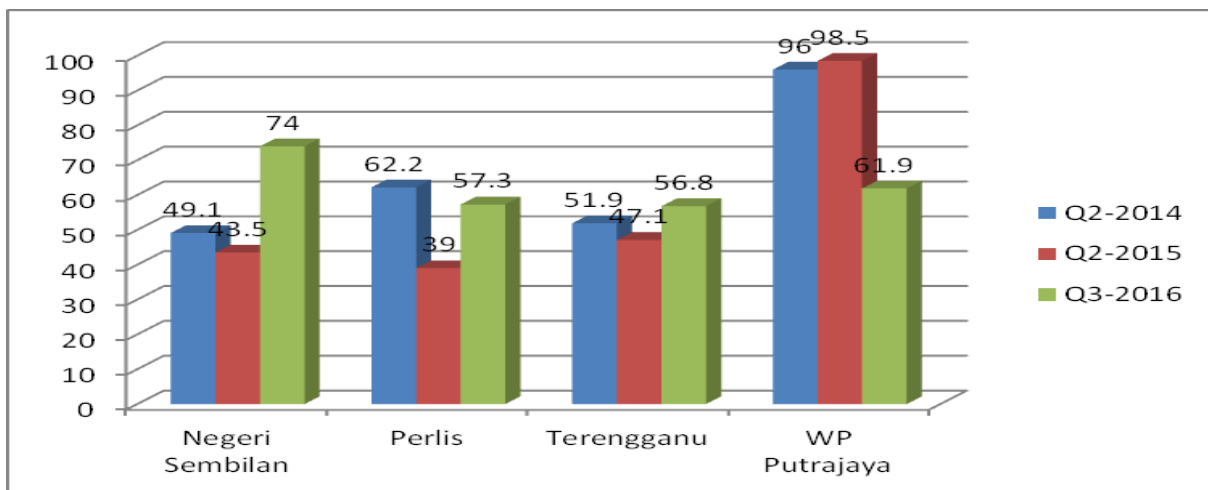

Figure 1.1: *Household broadband penetration for 1-year period(Q2 2014 to Q3 2016)*

(Source: Communication & Multimedia Pocketbook, MCMC 2015)

As indicated by Prieger(2013), the drop of household broadband penetration may be caused by a few factors, such as (1) the facility being too expensive, (2) low service quality, (3) inadequate service quality, or(4) users' lacking of exposure to computers. A number of studies were conducted on the initial use and adoption of information system (IS), butonly a few focused on broadband penetration in households. In one study,Muraina et al. (2015) uncovered thefactors that determine broadband intention. Kim and Malhotra (2005) argue thatthe adoption and the first use of any technology does not necessarily lead to the desired managerial outcome unless the use continues. Given these points, the present studywill provide new knowledge with regard to the continuance of broadband intention model.The study hence set the following objectives:
    i.   To investigate the relationship between control constructtowardsCBI among the users of public telecentres in Malaysia.
    ii.   To investigate the relationship between satisfaction towards CBI among the users of public telecentres in Malaysia.
    iii.   To investigate the impact of the moderating factor of gender on CBI among the   users of public telecentres in Malaysia.

THEORY

2.1 Research Hypotheses

Many studies have provided empirical evidence on the intention to use technology, and several studies have also examined the use of the information system (IS) theories. Nevertheless, the issues have been addressed in different perspectives thus have produced solutions only oncertain issues (Muraina, Osman and Ahmad, 2015).As reported by (MCMC, 2015),the complete facilitiesprovided by MCMC in Pi1M and training are for the community to access the broadband internet. Yet self-efficacy and perceived resources are among the important factors that will affect the adoption intentions of household consumers towards broadband (Irani et al., 2009).

Given the above points, this study will focus on the theoretical models of MATHand the IS continuance usage model as a foundation tothe research. Developed by Brown and Venkatesh (2005), the MATH modelproposesattitudinal, normative, and control constructsto predict people's intention to adopt technology in a household.

2.1.1 ControlConstruct
In the MATH model, the control constructsconsist of facilitating condition (FC), perceived knowledge (PK), and self-efficacy (SE). These constructs are amongthe major determinants that createindividuals' perceptions towards a behaviour. The acceptance and willingness to use broadband especially in low broadband penetration areas will determine the success of any application or system, especially *e*-Government websites or portal. Therefore, it is crucial for the government to develop an excellentsystem, although the success is much influenced by thecollaboration between the government and the willingness of the citizens to use the technology (Jayashree et al., 2016).Given these points, the followingresearch question (RQ) and hypothesis are posited:

RQ1: What is the effect of control construct towards theCBI among public telecentreusers?
H1: Control construct will have a positive relationship on CBI.

2.1.2 IS Continuous Usage

It is believed that users are viewed as the central part of information system, therefore as suggested by MurainaLenka, Suar and Mohapatra (2010),the determinant of both satisfaction and dissatisfaction of technology will determine the onward usage. The present study will use the model proposed byMuraina(2015),which suggests that thefactor of user satisfaction be a means of measuring the success of information system.Other studies by Jung, Chung, and Leue(2015) mention that satisfaction is a critical measure of the success and effectiveness of an information system.Satisfaction refers to the perceived discrepancy between prior expectation and perceived performance after consumption; dissatisfaction occurs when performance differs from expectation (Chen et al.2010, p.30).At the same time,a satisfaction level will evoke the different level of positive feelings and form the behaviour.Given these points, this study will link the following hypothesis to answer the second RQ:

RQ2: What is the effect of satisfactionon the CBI of public telecentreusers?
H2: Satisfaction will have a positive relationship with CBI.

2.1.3 Moderator
As suggested by Ooi et al.(2011), future research should include a moderating construct to examine the inter relationship among the adoption factors. Additionally,Rahman and Aziz (2014) mentioned that demographic characteristics (such as age, income, gender, and race) are often assumed to have significant effects on consumers' perceptions. Nevertheless, the present research focuses only on gender due to the simpler analysis on categorical data for the moderating construct, andother demographic variables will need to be assessed further in future research. The research question and hypothesis of moderating effect are as follows:
RQ3: What is the moderating effect of gender towardsCBI?
H3a: Demographic factor gender will moderate the effect of control constructon the CBI among public telecentre users.
H3b: Demographic factor of genderwill moderate the effect of satisfaction on the CBI among public telecentre users.
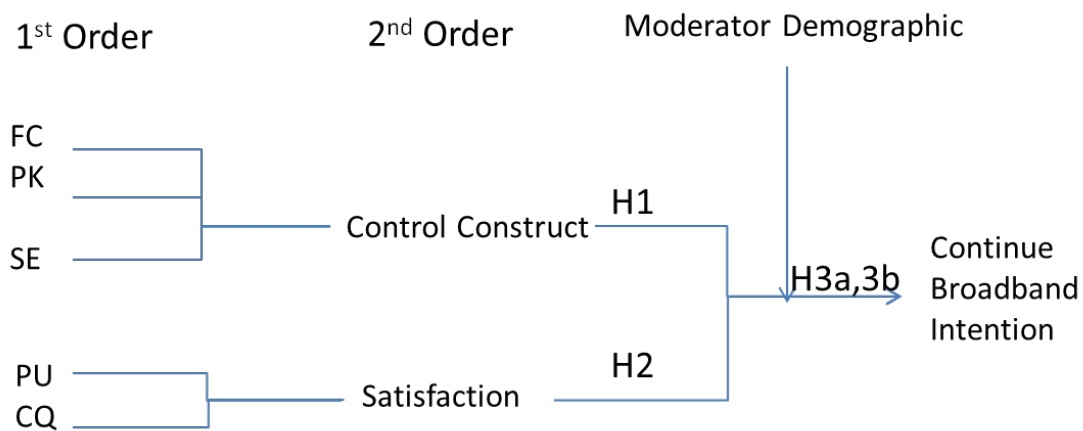Therefore based on the underpinning theory for this research, the following framework (Figure 2.3) is proposed.

Figure 2-3: *The research framework for the continuance of broadband intention (CBI)*

METHOD

3.1 Measurement Variables

An appropriate research design is crucial in determining an appropriate data collection method, such as type of data, data collection technique, and sampling methodology (Puspitasari and Ishii, 2016).In the present cross-sectional study, the data collection was performed only once in a determined period of time.Twenty-six items in a self-administered questionnaires were used (Table 3.1)and were further divided into two categories:(1) multiple choice questions which capture demographic variables such as age, gender, education, income, and background of broadband usage; and (2) five-point Likert-scale questions which were designed to address issues related to continuance of broadband intentions. The questionnaires were reviewed by six experts in academia and industries and minor improvementswere made based on their feedback. A total of 1200 questionnaires were distributed to all the sixregions nationwide.

3.2 Research Methodology

Based on clustered sampling, the hardcopyquestionnaireswere given randomly to the respondents, who are the registered users of the Pi1M, through the centre managers or via email or social media. Weekly follow-upswere made to the Pi1M managers and the questionnaires were then collected every two weeks in a three-month period. In three month, 406 completed questionnaires were received and 20 were excluded due to 20.0% of missing answers.Ultimately a response rate of 36.5% was obtained, which corresponded to that ofChin et al. (2009),and about the sameasthose in previous studies. The collected data were then analysed using Smart PLS 3.0 for measurement and structural model analysis. Furthermore, Gimpel et al. (2016)also advocated thatSmart PLS 3.0 makes minimal demands on data distributions, sample size, and measurement of scales. Also, this study is predictive in nature. The use of PLS path modellinghas becomeappropriate for real-world applications and advantageous for complex models in which the primary and crucial measures for data reliability are successfully performed(Chin and Dibbern, 2010).

Table 3.1: *Measurement of Variable*

Sources	Codes	Researcher's Modifications
Perceived Usefulness	PU1	Using broadband internet in public telecentres will improve my performance in managing my personal life.
	PU2	Using broadband internet in public telecentres will improve my performance in performing my work/study.
(Davis et al., 1992; Hsiao, Chang and Tang, 2016)	PU3	Using broadband internet in public telecentres will increase my productivity in managing my personal life.
	PU4	Using broadband internet in public telecentres will increase my productivity in managing my work/study.
	PU5	Using broadband internet in public telecentres will enhance my effectiveness in managing my personal life.
	PU6	Using broadband internet in public telecentres will enhance my effectiveness in managing my my work/study.
Content Quality	CQ1	Telecentres provides me with various information.
	CQ2	Telecentres provides me with various services.
Shin, (2009), Liou, Hsu andChih, (2015)	CQ3	The informations that I can get from a public telecentres are valuable.
	CQ4	The services that I can get from a public telecentres are valuable.
	FC1	Current PC in Public Telecentres is good enough to access the Internet.
Facilitating Condition Technology		
Venkatesh, 2003; Dviwedi andJyoti , 2005; Dwivedi, Mustafee, Williams and Lal, 2010)	FC2	There is no problem of broadband internet availability in my locality.
	FC3	My annual household income level is enough to afford subscribing to a broadband internet.
Facility Conditions	FC4	It is not too costly to purchase a new computer or to upgrade my old computer.
	FC5	It is not too costly for me to subscribe or to continue my subscription to broadband internet at its current subscription fee.

Venkatesh, 2003; Dviwedi andJyoti , 2005; Dwivedi, Mustafee, Williamsand Lal, 2010)	FC6	I would be able to subscribe to broadband internet if I wanted to.
	PK1	I do not have difficulty in explaining why continuing using broadband internet is beneficial.
Perceived Knowledge	PK2	I know that using broadband internet is different from using other broadband internet connection
Venkatesh, 2003; Dviwedi andJyoti , 2005; Dwivedi, Mustafee, Williams and Lal, 2010)	PK3	I know the benefits that can be offered from using broadband internet services.
	PK4	I know the benefits that cannot be obtained if I do not use broadband internet in public telecentres.
Self-Efficacy	SE1	I would feel comfortable using the broadband internet on my own.
	SE2	Learning to operate the broadband internet is easy for me.
	SE3	I clearly understand how to use broadband internet.
Venkatesh, 2003; Dviwedi andJyoti , 2005; Dwivedi, Mustafee, Williams and Lal, 2010; Irani et al., 2009)	SE4	I can use broadband internet proficiently.

Table 3.1: *(Continued)*

Sources	Codes	Researcher's modifications
	SE5	I can use broadband internet service freely eventhough those who teach me how to use the service are not around me.
(Park et al., 2016)	SE6	If I have manual and handbook that explains how to use the broadband internet service, I can use the service without any help.

FINDINGS

4.1 Profile of Respondents

A total of 1200 questionnaireswere distributed to twelve telecentres in six regions.Altogether, 406 responses were received hence representing a 33.8% (*n*=406) response rate. However, 20 samples with 20% missing data were removed from the analysis, leaving 386 responses. Among the respondents, 61% (*n*=235)were female and 31 % (*n*=151)were male,and 39% (*n*=149) were in the group of 17 to 24 years old and the least (6%) (*n*=23) werethose between 44 and55 years of age.In terms of education level,most of the respondents were undergraduateor have higher diploma (35%) (*n*=136),and postgraduates constituted the second highest (*n*=83)number of respondents.Diploma holders constituted the least number of respondents (*n*=27).

4.2 Convergent Validity

The collected data were first analysed on the measurement model using Smart PLS. This stepwas crucial for evaluating data reliability.As illustrated in Figure 4.1, the latent constructs such as facilitating condition (FC), perceived knowledge (PK), and self-efficiacy (SE)whichformed the second-order construct (control)were measured. The second-order construct,satisfaction, was formed by Content Quality (CQ) and Perceived Usefulness (PU).The second-order construct analysis contains all indicators of its first-order constructwhere the prediction of the model was made (Lowry and Gaskin, 2014). The first-order construct was qualified to be conceptually explained before the hypothesising of the second-order construct.Following the recommendations by Hair et al.(2014) andLuan and Teo (2009, p.265), measures were deleted due their unacceptable poor factor loadings on their respective latent variable (less than 0.5).The modified path analysis(Figure 4.1)with a standardised loading of at least 0.5demonstrates adequate support for convergent validityto ensure that only gooditems are carried over to the CFA stage of validation. The internal consistency of the model was measured by the instrument's convergent validity, which consists of composite reliability (CR) and average variantsextracted (AVE). The measurements were performed using Smart PLS 3.0.

The convergent validity results as shown in Table 4.1 attest that all the itemconstructsin the model are above the minimum requirement. Following the recommendations byNunnally and Bhattarajee(quoted in Jung et al, 2015, p.80),(1) the composite reliability is greater than 0.70; (2) the square root of average variance extracted (AVE)is more than 0.5, and (3) the value of Cronbach's alpha is greater than 0.70,which satisfies the reliability requirement.

4.3 Discriminant Validity

The discriminant validity was tested using Fornel and Lacker criterion and HeterotraitMonotrait Ratio (HTMT). Fornel and Lacker criterion was assessed by comparing the correlations construct (R^2)with the square root of the AVE for each construct, as illustrated in Table 4.2. A square root of the AVE greater than the correlation indicates an adequate Fornel and Lacker value, which justifies the discriminant validity. Further analysis of HTMT was done to indicate discriminant validity. From the analysis, the HTMT and discriminant validity are valid if the HTMT does not exceed 0.9 as shown in Table 4.3.Otherwise one can conclude the lack of discriminant validity on the measurement model(Sarstedt, Henseler and Ringle, 2011). Therefore as a conclusion,the measurement model demonstrated adequate convergent and discriminant validity.
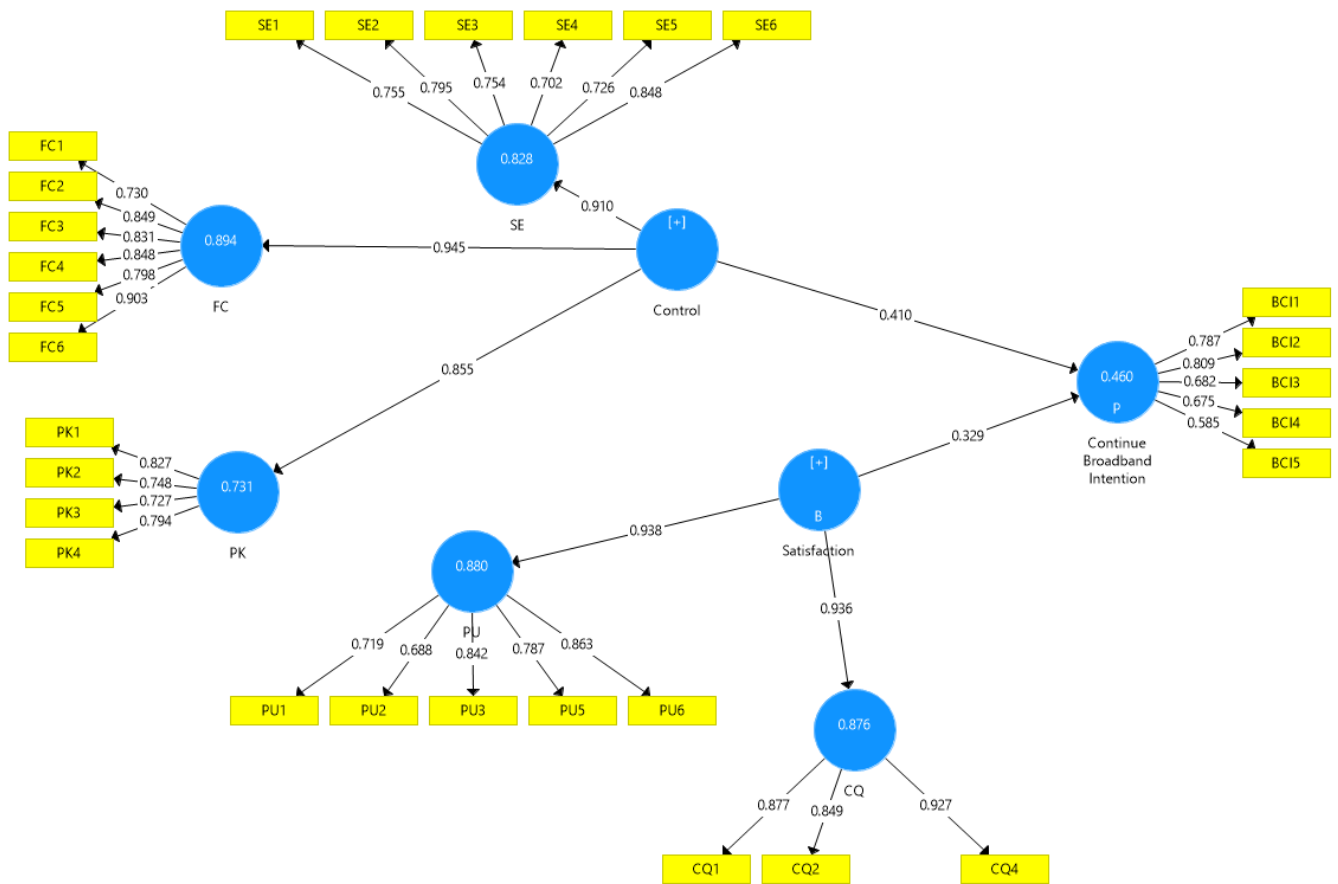

Figure 4.1: *Modified path analysis*

4.4 Hypothesis Testing

This study utilisedstandardised estimates for all the hypothesised paths. The findings show that the control factor has positive influence and significant result (β = 0.410, *t* = 7.720, *p*< 0.05) on continuance of broadband intention (CBI). At the same time, satisfaction also has positive influence towards CBI (β = 0.329, *t* = 6.996). By using the PLS algorithm analysis, the value of coefficient of determination (R^2=0.460). As described by Ringle (2009),the value of R^2> 0.33 in the inner moderate. At the same time, the PLS algorithm analysis gaveaneffect size (f^2)of 0.167 for the control construct and 0.09 for satisfaction. Hair et al. (2014)considered the value of f^2between 0.02 to 0.15 as small, and 0.15 to 0.35 as the medium effect on the exogenous latent variable. The summary in Table 4.4 shows that the analysis has answered RQ1 and RQ2,as well as H1 and H1.

Table 4.1: *Convergent Validity*

Measurement	Item	Floading	Cronbach's Alpha	rho_A	Cpmp. Reliability	AVE
CBI	BCI1	0.787	0.751	0.751	0.836	0.508
	BCI2	0.809				
	BCI3	0.682				
	BCI4	0.675				
	BCI5	0.585				

CQ	CQ1	0.877	0.861	0.864	0.915	0.783
	CQ2	0.849				
	CQ4	0.927				
FC	FC1	0.730	0.907	0.912	0.929	0.686
	FC2	0.849				
	FC3	0.831				
	FC4	0.848				
	FC5	0.798				
	FC6	0.903				
PK	PK1	0.827	0.777	0.783	0.857	0.600
	PK2	0.748				
	PK3	0.727				
	PK4	0.794				
PU	PU1	0.719	0.839	0.843	0.887	0.613
	PU2	0.688				
	PU3	0.842				
	PU5	0.787				
	PU6	0.863				
SE	SE1	0.755	0.858	0.870	0.894	0.585
	SE2	0.795				
	SE3	0.754				
	SE4	0.702				
	SE5	0.726				
	SE6	0.848				
	Second Order					
Control	FC	0.945	0.936	0.942	0.944	0.519
	PK	0.945				
	SE	0.855				
Satisfaction	PU	0.938	0.914	0.909	0.924	0.552
	CQ	0.936				

Table 4.2: *Discriminant Validity: FornelandLacker Criterion*

	CQ	FC	PK	PU	SE
CQ	0.885				
FC	0.561	0.828			
PK	0.540	0.738	0.775		
PU	0.766	0.619	0.527	0.783	
SE	0.581	0.722	0.670	0.608	0.765

Note: The diagonal values (bolded) are square root of AVE; off diagonal is correlation among the first order construct

Table 4.3: *Discriminant Validity: HeterotraitMonotrait Ration (HTMT)*

	CQ	FC	PK	PU	SE
CQ	1.000				
FC	0.634	1.000			
PK	0.664	0.871	1.000		
PU	0.896	0.715	0.658	1.000	
SE	0.666	0.860	0.801	0.718	1.000

Table 4.4: *Summary of Result for Hypothesis Testing using PLS Algorithm and Bootstrapping*

Hyphothesis	Path	Path coefficient (β)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	f^2	P Values	Significant
H1	Control -> CBI	0.410	0.053	7.720	0.165	0.000	Yes
H2	Satisfaction -> CBI	0.329	0.047	6.996	0.090	0.000	Yes

4.5 Moderating Effect Gender

Following the recommendation of Hair et al. (2014), the categorical variable of gender was dichotomised before executing the analysis using PLS algorithm, which generated the moderated path model (Figure 4.1).As shown in Figure 4.2, female moderates higher than male with astrengtheningeffect on the control and satisfactionfactorstowards CBIfollowing the increase of R^2 value to 0.488.The effect size of the moderating factors to control construct also increased(f^2 =0.182) compared to unmoderated. At the same time very small moderating effect of gender was noted on satisfaction (f^2= 0.093) after running on moderated model. The overall moderating factor of gender strengthens the effects for both control and satisfaction when the value of R^2 improved from 0.460 to 0.488. This findingthus answers RQ3a, H3a, RQ3b, and H3b.
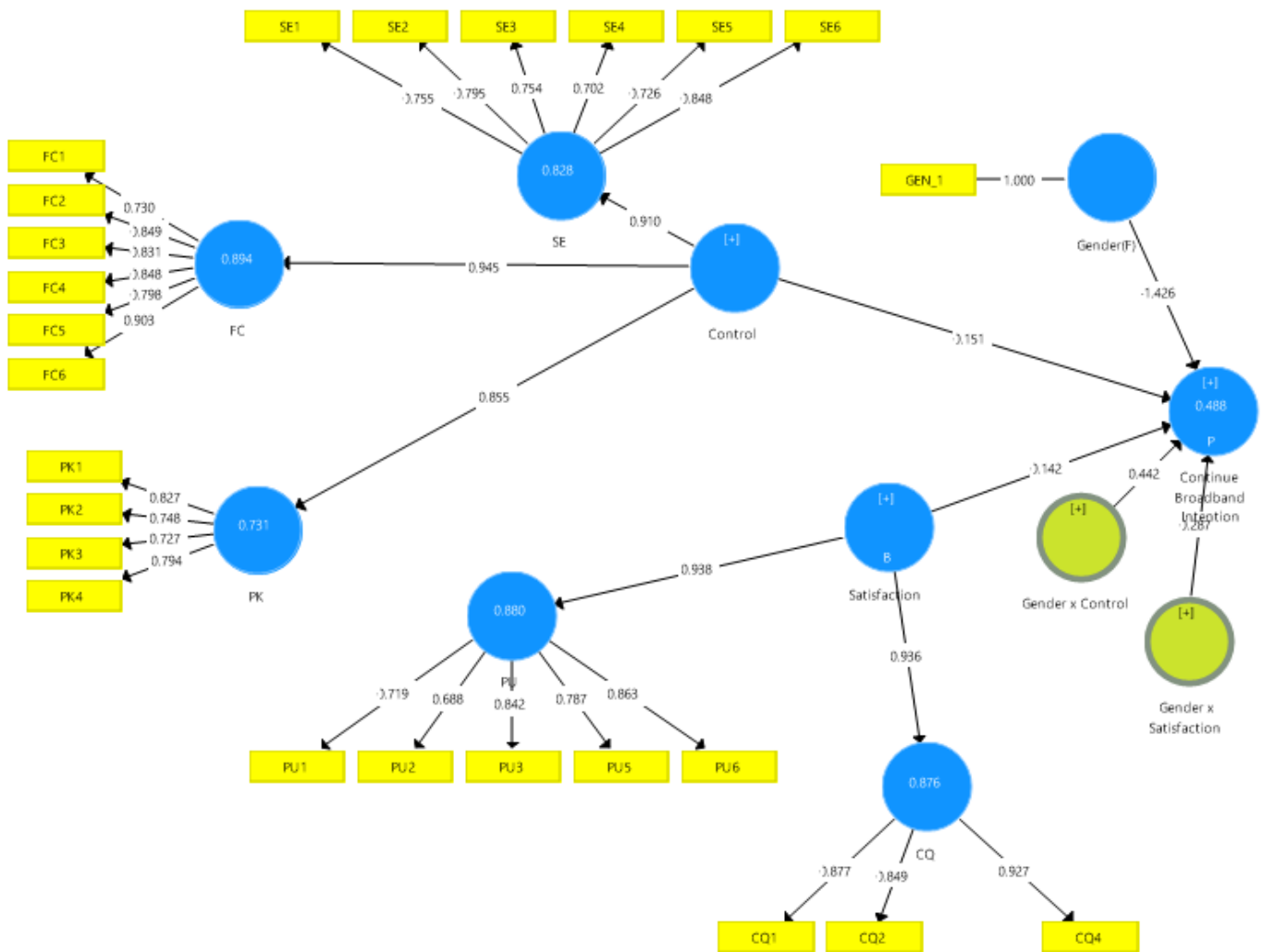

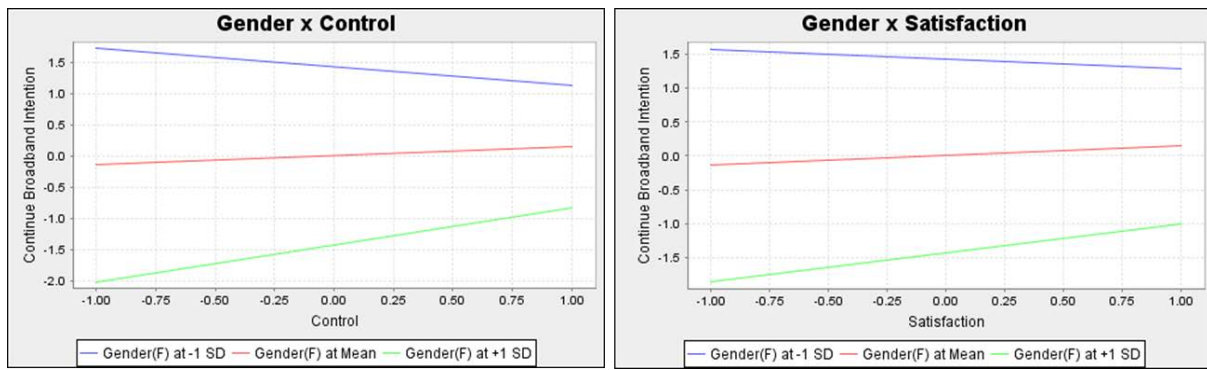Figure 4.2: *Modified path model for moderator of Gender*

Figure 4.3: *Moderating effects of gender on control and satisfaction construct*

CONCLUSIONS

By adapting the MATH model, the present research investigates the roleof some factors towards the continuance of broadband intention (CBI) among users. The results were obtained by using Smart PLS 3.0 and the findings reveal that the second-order construct of control and satisfaction factors are significant. The findings also attest that among the control factors, FC is the most important factor that policy makers and service providers need to focus on in order to ensure the sustainable growth of household broadband penetration in Malaysia.To increase users' satisfaction, CQ is the area to focus for improvement.Because the deployment of broadband across many countries is a continuing effort, policy makers also need to focus on the quality of the content. This aspect needs to be updated from time to time especially in terms of the benefits of the broadband and what it can offer.

IMPLICATION

This study also finds that gender plays an important role towards CBI because the moderating effect (f^2) is significant especially on the control construct. The service provider should start gender-based programs that are developed for a specific or focus group.As pointed byTurk and Trkman (2012), the adoption of new technologies in households is always a complex process, but from time to time,the diffusion of broadband has attracted unprecedented attention in the research and political community.

REFERENCES

AZIZ, J., RAZAK, N. A., MALEK, J. A., M.N, N. F. and AMIR, Z. (2009) Community broadband: Towards education for all.*Proceedings of the 8th WSEAS International Conference on Education and Educational Technology, EDU '09*, pp. 248–252.

BROWN, S. and VENKATESH, V. (2005) Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle.*MIS Quarterly*, 29(3), pp. 399–426. doi: 10.2307/25148690.

CHEN, C. F. and CHEN, F. S. (2010) Experience quality, perceived value, satisfaction and behavioral intentions for heritage tourists.*Tourism Management*. Elsevier Ltd, 31(1), pp. 29–35. doi: 10.1016/j.tourman.2009.02.008.

CHIN, W. W. and DIBBERN, J. (2010) *Handbook of Partial Least Squares*, *Handbook of Partial Least Squares*. doi: 10.1007/978-3-540-32827-8.

CHIN WEI, C., SIONG CHOY, C. and KUAN YEW, W. (2009) Is the Malaysian telecommunication industry ready for knowledge management implementation?*Journal of Knowledge Management*, 13(1), pp. 69–87. doi: 10.1108/13673270910931170.

GIMPEL, G., SUDZINA, F. and PETROVCIKOVA, K. (2016) Mobile ICT use in early adopter vs. late majority countries. *International Journal of Mobile Communications*, 14(6), p. 610. doi: 10.1504/IJMC.2016.079305.

HAIR, F. J., SARSTEDT, J. M., HOPKINS, L. and KUPPELWIESER, G. V. (2014) Partial least squares structural equation modeling (PLS-SEM).*European Business Review*.

IRANI, Z., DWIVEDI, Y. and WILLIAMS, M. (2009) Understanding consumer adoption of broadband: An extension of the technology acceptance model.*Journal of the Operational Research Society*, 60(10), pp. 1322–1334. doi: 10.1057/jors.2008.100.

ITU (2016) *ICT Development index 2016*. Available at: http://www.itu.int/net4/ITU-D/idi/2016/ (Accessed: 23 January 2016).

JAYASHREE, S., SALEHI, F., ABDOLLAHBEIGI, B. and AGAMUDAINAMBI MALARVIZHI, C. (2016) Factors Influencing Intention to use E-Government Services among Iran Citizens.*Indian Journal of Science and Technology*, 9(34). doi:

10.17485/ijst/2016/v9i34/91943.

JUNG, T., CHUNG, N. and LEUE, M. C. (2015) The determinants of recommendations to use augmented reality technologies: The case of a Korean theme park.*Tourism Management*. Elsevier Ltd, 49, pp. 75–86. doi: 10.1016/j.tourman.2015.02.013.

KIM, S. S. and MALHOTRA, N. K. (2005) A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena.*Management Science*, 51(5), pp. 741–755. doi: 10.1287/mnsc.1040.0326.

KIRAN, P. and VASANTHA, S. (2016) Transformation of consumer attitude through social media towards purchase intention of cars.*Indian Journal of Science and Technology*, 9(21). doi: 10.17485/ijst/2016/v9i21/92608.

LENKA, U., SUAR, D. and MOHAPATRA, P. K. J. (2010) Soft and Hard Aspects of Quality Management Practices Influencing Service Quality and Customer Satisfaction in Manufacturing-oriented Services.*Global Business Review*, 11(1), pp. 79–101. doi: 10.1177/097215090901100105.

LOWRY, P. B. and GASKIN, J. (2014) Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it.*IEEE Transactions on Professional Communication*, 57(2), pp. 123–146. doi: 10.1109/TPC.2014.2312452.

LUAN, W. S. and TEO, T. (2009) Investigating the Technology Acceptance among Student Teachers in Malaysia: An Application of the Technology Acceptance Model (TAM).*The Asia-Pacific Education Researcher*, 18, pp. 261–272. doi: 10.3860/taper.v18i2.1327.

MCMC (2014) *Annual Report Universal Service Provision*. Available at: https://www.skmm.gov.my/skmmgovmy/media/General/pdf/SKMM-USP-2014.pdf (Accessed: 16 June 2016).

MCMC (2015) *Annual Report Universal Service Provision 2015*. Available at: https://www.skmm.gov.my/skmmgovmy/media/General/pdf/MCMC_USP_Report_2015_bi.pdf (Accessed: 21 July 2016).

MURAINA, I. D. (2015) The Factors That Contribute to the Continuous Usage of Broadband Technologies among Youth in Rural Areas: A Case of Northern Region of Malaysia.

MURAINA, I. D., OSMAN, W. R. B. S. and AHMAD, A. (2015) The roles of some antecedents of broadband user behavioural intention among students in the rural areas through PLS-SEM.*American Journal of Applied Sciences*, 12(11), pp. 820–829. doi: 10.3844/ajassp.2015.820.829.

NIEHAVES, B. and PLATTFAUT, R. (2014) Internet adoption by the elderly: employing IS technology acceptance theories for understanding the age-related digital divide.*European Journal of Information Systems*, 23(6), pp. 708–726. doi: 10.1057/ejis.2013.19.

OOI, K.-B., SIM, J.-J., YEW, K.-T. and LIN, B. (2011) Exploring factors influencing consumers' behavioral intention to adopt broadband in Malaysia.*Computers in Human Behavior*, 27(3), pp. 1168–1178. doi: 10.1016/j.chb.2010.12.011.

PRIEGER, J. E. (2013) The broadband digital divide and the economic benefits of mobile broadband for rural areas.*Telecommunications Policy*. Elsevier, 37(6–7), pp. 483–502. doi: 10.1016/j.telpol.2012.11.003.

PUSPITASARI, L. and ISHII, K. (2016) Digital divides and mobile Internet in Indonesia: Impact of smartphones. *Telematics and Informatics*. Elsevier Ltd, 33(2), pp. 472–483. doi: 10.1016/j.tele.2015.11.001.

Rahman and Aziz (2014) Service quality and behavioural intentions in broadband services selection. doi: 10.1108/MIP-06-2013-0093.

RINGLE, C. M. (2009) The Use of Partial Least Squares Path Modeling in International Marketing. 7979(January). doi: 10.1108/S1474-7979(2009)0000020014.

SARSTEDT, M., HENSELER, J. and Ringle, C. M. (2011) 'Multigroup Analysis in Partial Least Squares (PLS) Path Modeling: Alternative Methods and Empirical Results', *Measurement and Research Methods in International Marketing (Advances in International Marketing)*, 22(2011), pp. 195–218. doi: 10.1108/S1474-7979(2011)0000022012.

TURK, T. and TRKMAN, P. (2012) 'Bass model estimates for broadband diffusion in European countries', *Technological Forecasting and Social Change*. University of Ljubljana, Faculty of Economics, Kardeljeva ploščad 17, 1000 Ljubljana, Slovenia, 79(1), pp. 85–96. doi: 10.1016/j.techfore.2011.06.010.